* Absolute revenue changes (against pre-modification situation)
* Relative revenue changes (%)
* Error estimate of predicted revenue
* Expected demands under the modified scheduling
* (For clearance pricing) Predicted leftover stocks
* Demand sensitivities under the modified scheduling
* Revenue sensitivities under the modified scheduling

End of List of Basic User Report Options

Of course, the user may request more than one modification scenario.

Options for Manipulating Existing Reports are essentially the same as for optimization reports earlier.

List of Commands for Manipulating Existing Reports

* Open
(Contains options for selecting reports by attributes like shop ID, dates, etc.)
* Close
* Save (as)
* Print
* Properties

End of List of Commands for Manipulating Existing Reports

After obtaining estimated results for one or more modification scenarios, the user will probably wish to compare them with previous results and also among themselves. Note that when comparing existing results with estimated post-modification results, the comparisons will be made essentially between actually observed values and predicted (estimated) values.

Inter-Scenario Comparisons: The same as for Pricing Optimization Scenarios

Graphical Representation: The same as for Pricing Optimization Scenarios

CLAIMS

What is claimed is:

1. A marketing decision support system for food stores, supermarkets, and store chains or groups thereof, intended for optimization of a preferred merchandising figure-of-merit predictive function (revenue, profit, and the like) in product prices and promotion schedules of a plurality of remotely-operated in-store computer monitors, the system comprising:

a) A historical database connected to the said marketing decision support system that contains scanner-type data;

b) A procedure for flexible modeling and efficient optimization of joint effects of pricing and promotion factors, and also of various other-related influence factors on product demands of a plurality of products on sale;

c) Means for data mining of the said historical database with the dual purpose of flexible aggregation of individual sale and promotion records into data batches corresponding to user-selected or system-determined time periods, and of extracting the contents of database fields corresponding to the said influence factors;

d) Means for construction of an integrated pricing and promotion regression model or of a set of integrated pricing and promotion regression models suitable for capturing joint effects of the plurality of said influence factors including pricing and promotion variables on the demands of the plurality of products on sale;

e) An efficient estimation procedure of said integrated pricing and promotion regression models capable both of simultaneous estimation and of separate stepwise estimation;

f) Means for construction of predicted future demands for products in categories with substitute demands and with complementary demands;

g) Means for isolating effects of prices on product demands in categories based on said efficient estimation procedure;

h) Means for isolating effects of display (exposition) times of a plurality of promotion clips (running on various in-store monitors) on product demands in categories based on said efficient estimation procedure;

i) Means for setting up and running a secondary database containing only the data necessary for estimation and optimization computations and storing them in a form suitable for fast reading and processing.

2. A marketing decision support system according to claim 1, wherein in the procedure for flexible modeling and efficient optimization, said other-related influence factors may include some or all but are not restricted to the following factors: product prices, product brands, sales discounts, quantity discounts, promotion schedules, various days of the week, pre-holiday days, post-holiday days, year seasons, past sales histories, additional factors derived by the system from the listed factors, and also additional factors defined by the user on occasional or permanent basis and entered at the system interface.

3. A marketing decision support system according to claim 1, wherein the means for data mining includes means for determining structure and sizes of said data batches in such a way as to enable construction of integrated pricing and promotion regression models for capturing the effects of various promotion schedules.

4. A marketing decision support system according to claim 1, wherein the means for data mining further includes means for detecting missing and "bad" data in the said historical database, and also means for imputation of missing data and for correction and cleaning of "bad" data.

5. A marketing decision support system according to claim 1, wherein in the means for data mining, said means for inputing missing data and for correcting and cleaning of "bad" data are configured as to be particularly suitable for the purposes of construction of integrated pricing and promotion regression models.

6. A marketing decision support system according to claim 1, wherein the means for data mining further includes means for obtaining robust summary statistics related to said sales record batches which enable estimation of integrated pricing and promotion regression models to be performed by standard non-robust statistical methods.

7. A marketing decision support system according to claim 1, wherein the means for construction of integrated pricing and promotion regression models includes means for sorting said other-related influence factors into relevant and irrelevant groups.

8. A marketing decision support system according to claim 1, wherein in the means for construction of integrated pricing and promotion regression models said regression models are based on said relevant influence factors and use said corrected and cleaned data.

9. A marketing decision support system according to claim 1, wherein in the means for construction of regression models said regression models contain weights that reflect sales volumes associated with said data batches.

10. A marketing decision support system according to claim 1, wherein in the means for construction of regression models said regression models further reflect breakdown of the plurality of products on sale into product categories consisting of products with substitute demands and complementary demands.

11. A marketing decision support system according to claim 1, wherein the efficient estimation procedure is capable of separately estimating effects of individual influence factors and of groups of influence factors.

12. A marketing decision support according to claim 1, wherein the efficient estimation procedure is capable of generating an estimation process evolving in real time in which later and better estimates are based on earlier estimates and on newly obtained sales data.

13. A marketing decision support system according to claim 1, wherein the means for construction of predicted future demands is capable of accounting for strong mutual dependencies among sales of substitute and of complementary products.

14. A marketing decision support system according to claim 1, wherein the means for isolating effects of prices on product demands provides for price optimization.

15. A marketing decision support system according to claim 1, wherein the means for isolating effects of display (exposition) times provides for promotion optimization.

16. A marketing decision support system according to claim 1, wherein in the means for setting up and running a secondary database said secondary database is also used for storing newly obtained sales data in a form suitable for fast reading and processing thus obviating the need for time-consuming and expensive process of data mining the historical master database.

17. A marketing decision support system according to claim 1, wherein the marketing decision support system further comprises a system for optimization of a preferred merchandising figure-of-merit predictive function in product prices that contains eight major modules:

a) Single product regular price optimization module appropriate for optimizing a preferred figure-of-merit predictive function for selected single products under regular sales conditions;

b) Product category regular price optimization module appropriate for optimizing a category figure-of-merit predictive function for selected product categories under regular sales conditions;

c) Single product clearance price optimization module appropriate for optimizing a preferred figure-of-merit predictive function for selected single products under clearance sales conditions;

d) Product category clearance price optimization module appropriate for optimizing a category figure-of-merit predictive function for selected product categories under clearance sales conditions;

e) Prediction error estimation module;

f) Significance testing module;

g) Sensitivity-assessing module;

h) A confirmation facility module that allows the user to always review price changes computed by the system and to register his consent through a password-protected channel of the user interface to the system prior to any price changes to be actually implemented.

18. A marketing decision support system according to claim 17, wherein the single product regular price optimization module comprises: A preferred figure-of-merit predictive function of a single product regular price; localization constraints related to the current product price; range constraints related to the product extreme price values as recorded in the database; optional price range restrictions as imposed by the user under the selected optimization scenario.

19. A marketing decision support system according to claim 17, wherein the product category regular price optimization module comprises: A preferred figure-of-merit

predictive function of product category regular prices; localization constraints related to the current category prices; range constraints related to the category extreme price values as recorded in the database; optional price range restrictions as imposed by the user under the selected optimization scenario.

20. A marketing decision support system according to claim 17, wherein the single product clearance price optimization module comprises: A preferred figure-of-merit predictive function of a single product clearance price; localization constraints related to the current product price; range constraints related to the product extreme price values as recorded in the database; optional price range restrictions as imposed by the user under the selected optimization scenario.

21. A marketing decision support system according to claim 17, wherein the single product clearance price optimization module also computes predicted sales volume and predicted leftover stock.

22. A marketing decision support system according to claim 17, wherein the product category clearance price optimization module comprises: A preferred figure-of-merit predictive function of a mix of product category regular prices and product category clearance prices; localization constraints related to the current category prices; range constraints related to the category extreme price values as recorded in the database; optional price range restrictions as imposed by the user under the selected optimization scenario.

23. A marketing decision support system according to claim 17, wherein the product category clearance price optimization module also computes predicted sales volumes and predicted leftover stocks for all clear-out products.

24. A marketing decision support system according to claim 17, wherein the prediction error estimation module uses resampling methods for estimation of prediction errors, standard errors and biases in predicted single product optimal prices and in predicted category optimal price vectors.

25. A marketing decision support system according to claim 17, wherein the prediction error estimation module further uses resampling methods for estimation of prediction errors, standard errors and biases in single product figure-of-merit predictive functions and in category figure-of-merit predictive functions.

26. A marketing decision support system according to claim 17, wherein the significance-testing module uses resampling methods for testing significance of optimized price changes in predicted single product optimal prices and in predicted category optimal price vectors.

27. A marketing decision support system according to claim 17, wherein the significance-testing module further uses resampling methods for testing significance of figure-of-merit function changes for predicted single product optimal prices and for predicted category optimal price vectors.

28. A marketing decision support system according to claim 17, wherein the sensitivity-assessing module comprises means for assessing sensitivity of the predicted single product price functions relative to price range restrictions.

29. A marketing decision support system according to claim 17, wherein the sensitivity-assessing module further comprises means for assessing sensitivity of the predicted category price functions relative to price range restrictions.

30. A marketing decision support system according to claim 17, wherein the sensitivity-assessing module further comprises means for assessing sensitivity of single product figure-of-merit predictive functions relative to price range restrictions.

31. A marketing decision support system according to claim 17, wherein the sensitivity-assessing module further comprises means for assessing sensitivity of category figure-of-merit predictive functions relative to price range restrictions.

32. The marketing decision support system as recited in claim 1 further comprising a system for optimization of a preferred merchandising figure-of-merit predictive function in promotion schedules that contains eight major modules:

a) An initial scheduling module for constructing initial promotion schedules for a plurality of promotion clips running on in-store onitors when there are no sufficient data for estimation of promotion schedule effects on product demands;

b) A module for estimating promotion schedule effects of a plurality of promotion clips running on in-store monitors on product demands, based on said means for isolating effects of display (exposition) times of a plurality of promotion clips (running on various in-store monitors) on product demands in categories based on said efficient estimation procedure;

c) A module for selecting a group of best schedules from all recorded optimal schedules;

d) A module for constructing locally weighted regressions for a preferred figure-of-merit predictive function in the vicinity of each of the best schedules;

e) A module for computing figure-of-merit predictive function increases for all best schedules;

f) A module for performing local optimization of the figure-of-merit predictive function in the vicinity of all best schedules, and then selecting the schedule with the largest predicted figure-of-merit increase;

g) A significance testing module that uses resampling methods for testing significance of the largest predicted figure-of-merit increase;

h) A module for constructing a next promotion schedule that either selects the schedule with the largest predicted figure-of-merit increase if the result of the

said significance testing was significant, or, alternatively, constructs a new promotion schedule in the vicinity of the existing promotion schedules.

33. A marketing decision support system as recited in claim 32, wherein a method for modifying the module for local optimization of the figure-of-merit predictive function allows for incorporating additional user-defined constraints such as the number of brand item clips or the number of clip demonstrations related to a particular product group within a given time period.

34. A marketing decision support system as recited in claim 32, wherein an automatic promotion control system provides unlimited in time automatic functioning of the module for optimization of the figure-of-merit predictive function during two time periods: initial period and main period.

35. A marketing decision support system as recited in claim 34, wherein in the automatic promotion control system said initial period contains a predefined finite number of time periods.

36. A marketing decision support system as recited in claim 34, wherein in the automatic promotion control system said main period contains a potentially infinite number of time periods.

37. The marketing decision support system as recited in claim 1 further comprising a powerful and flexible user interface containing a plurality of optimization and prediction scenarios partitioned into three groups according to the following templates: Pricing Optimization Scenarios, Pricing Prediction Scenarios, Promotion Scheduling Scenarios.

38. The marketing decision support system as recited in claim 37, wherein in the user interface each optimization or prediction scenario can be obtained by the user from a corresponding template by making option selections, entering various input parameter values, and accepting certain defaults.

39. The marketing decision support system as recited in claim 37, wherein the user interface contains facilities for producing flexible user-friendly reports presenting results of the requested computations according to selected scenarios in written and in graphical forms.

40. The marketing decision support system as recited in claim 37, wherein in the user interface said Pricing Optimization Scenarios template contains the following groups of options: Basic Input Options and Input Parameters, Additional Input Options, Advanced User Input Options, Basic User Report Options, Additional User Report Options, Recalculation Options, Additional Optimization Options, Options for Manipulating Existing Reports, Inter-Scenario Comparisons, Graphical Representation.

41. The marketing decision support system as recited in claim 37, wherein in the user interface said Pricing Prediction Scenarios template contains the following groups of options: Basic Input Options and Input Parameters, Additional Input Options, Advanced User Input Options, Basic User Report Options, Additional User Report

Options, Recalculation Options, Additional Prediction Options, Options for
Manipulating Existing Reports, Inter-Scenario Comparisons, Graphical
Representation.

42. The marketing decision support system as recited in claim 37, wherein in the user
interface said Promotion Scheduling Scenarios template contains the following groups
of options: Reporting on Current Scheduling: Basic User Options, Reporting on
Current Scheduling: Additional User Report Options, Modifications: Basic Input
Options and Input Parameters, Modifications: Advanced User Input Options, Post-
Modification Reporting: Basic User Report Options, Options for Manipulating
Existing Reports, Inter-Scenario Comparisons, Graphical Representation.